UNITED STATES DISTRICT COURT DISTRICT OF MASSACHUSETTS

SINGULAR COMPUTING LLC, | Civil Action No. 1:19-cv-12551-FDS

Plaintiff,

Hon. F. Dennis Saylor IV

v.

GOOGLE LLC, REDACTED VERSION

Defendant. ORAL ARGUMENT REQUESTED

PLAINTIFF'S OPPOSITION TO GOOGLE'S MOTION TO EXCLUDE CERTAIN OPINION TESTIMONY OF PHILIP GREEN

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I. INTRODUCTION

Google's *Daubert* Motion does not challenge Mr. Green's expertise or the cost savings methodology on which his opinions are based.¹ Instead, without any valid basis to challenge Mr. Green on proper *Daubert* grounds, Google relies on inapplicable legal concepts and case law and advances fact-based arguments that are the proper subject of cross examination, not exclusion under Fed. R. Evid. 702 or *Daubert*. Google's Motion should be denied in its entirety.

Google's reliance on the entire market value rule ("EMVR") and the smallest salable patent practicing unit ("SSPPU") doctrine is misplaced. Neither doctrine is implicated by Mr. Green's methodology or the facts of this case. The benefit of infringement to Google is the massive systemwide cost savings that the accused Mr. Green's determination of a reasonable royalty based on those cost savings follows well-settled Federal Circuit precedent. He first relies on Google's own documented analysis of the benefits of the infringing to determine that, as a direct result of its decision to infringe instead of using less effective, Contrary to Google's assertions, that amount is not based on the market value of the TPU system, ; it is the amount Google would have to spend to generate the same computing power with GPUs that it generates with TPUs. . Rather, Mr. Green conducts two separate apportionment analyses – a technical apportionment and an accounting apportionment – that properly isolate the benefits attributable to the patented technology on the TPU chip as

¹ A copy of Mr. Green's full report, including his curriculum vitae, is attached as Exhibit A to the accompanying Declaration of Daniel McGonagle. All exhibit references are to those attached to the McGonagle Declaration.

opposed to non-patented features. Google's criticisms of Mr. Green's apportionment concern the factual underpinnings of his analysis, which goes to the weight of his testimony, not to its admissibility.

Google's other challenges to Mr. Green's opinions are similarly flawed. Google complains that Mr. Green's application of alternative methodologies creates a speculative royalty range. But, as the Federal Circuit has explained, when there is more than one reasonable approach to determine a royalty, the jury should hear them all and evaluate which is best. Again, Google's challenge is for cross-examination, not exclusion.

The Court should also reject Google's request that Mr. Green be prohibited from discussing information regarding the parties' relationship at the time of the hypothetical negotiation. Far from "parroting Singular's narrative of the case," Mr. Green discusses the parties' relationship at the time of the hypothetical negotiation, which is relevant to *Georgia-Pacific* Factor 5 and will assist the jury in recreating the hypothetical negotiation that would have taken place between Google and Singular at the time infringement began.

II. FACTUAL BACKGROUND

A. The Patented Technology

Singular's patents, U.S. Patent Nos. 8,407,273 and 9,218,156 (collectively, the "Patents-In-Suit"), relate to methods and apparatus for performing arithmetic operations on numerical values of low precision but high dynamic range ("LPHDR"). Ex. A, Green Rpt. at 1. The computer architectures included in the asserted claims allow for the delivery of an increased amount of computing power per unit of resource, which is critical for artificial intelligence ("AI") applications. *Id.* at 1-2.

B. Google's Use of the Invention and Its Comparisons of TPUs and GPUs

There is no dispute that Google exclusively
Ex.A,
Green Rpt. at 37-38. Those services are Google's principal source of revenue. Between 2018 and 2022, Google's advertising revenue alone totaled \$832 billion. ²
Further,
5 Id.

 $^{^2}$ In the years ended 2018, 2019, 2020, 2021 and 2022, Google reported advertising revenue of \$116.3 billion, \$134.8 billion, \$146.9 billion, \$209.5 billion, and \$224.5 billion, respectively. Ex. C, 2018 Form 10-K at 27; Ex. D, 2019 Form 10-K at 29; Ex. E, 2020 Form 10-K at 33; Ex. F, 2021 Form 10-K at 33.

³ David Patterson is a Google distinguished engineer and recipient of the Turing Award often referred to as the "Nobel Prize of Computing." *See* Ex. G, https://research.google/people/105290/.

III. MR. GREEN'S METHODOLGY AND OPINIONS

Mr. Green applies the well-recognized Georgia-Pacific "hypothetical negotiation"
framework to determine a reasonable royalty in this matter. Both Mr. Green and Ms. Stamm
(Google's damages expert) agree that the hypothetical negotiation would occur in March 2017
when Google's TPUv2 chips were released. Ex. A, Green Rpt. at p. 63; Ex. H, Stamm Rpt. at
¶ 122.
See e.g., Ex. A, Green Rpt. at
63, 109; Ex. H, Stamm Rpt. at ¶ 15. Where Mr. Green and Ms. Stamm's respective analyses differ
is over the inputs and assumptions that relate to the measurement of Google's cost savings.
In Mr. Green's lump sum analysis, he first evaluates quantitative indicators of the benefits
Google obtained from the use of the accused TPUs.
Considering
these quantitative metrics, Mr. Green applies the Georgia-Pacific factors, including apportioning
the cost savings to reflect only the value of the use of the patented technology.
The
size of these lump sums is driven by the large number of accused TPU chips that Google actually
deployed and the cost savings to Google that their use enabled.

A. A	Analysis of (Google's Incre	emental Cost	Savings	

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B. Analysis of Georgia-Pacific Factors

Using the foregoing quantitative analyses as starting points, which are based on Google's internal documents and analysis. Mr. Green considers each of the *Georgia-Pacific* factors. These factors include consideration of the parties' prior licensing (Factors 1 and 2), the existing relationship between Google and Singular's principal and inventor of the patents, Dr. Joseph Bates (Factor 5), the term of the license (Factors 3 and 7), and the parties' profitability and operations (Factors 8 and 11). Ex. A, Green Rpt. at 84-113.9

C. Mr. Green's Damages Conclusion	

IV. LEGAL STANDARD

Federal Rule of Evidence 702 allows admission of "scientific, technical, or other specialized knowledge" by a qualified expert if it will "help the trier of fact to understand the evidence or to determine a fact in issue." Fed. R. Evid. 702(a). An expert witness may present opinion testimony to a factfinder if: (1) "the testimony is based on sufficient facts or data"; (2) "the testimony is the product of reliable principles and methods"; and (3) "the expert has reliably applied the principles and methods to the facts of the case." *Id.* at Rule 702 (b)-(d); *see also Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 589 (1993).

While the court acts as "gatekeeper" when applying Rule 702 to determine the admissibility of expert testimony, it must be careful not to act as a fact finder. *U.S. v. Sandoval-Mendoza*, 472 F.3d 645, 654 (9th Cir. 2006) (Under *Daubert*, "the district court [is] a gatekeeper, not a fact finder."). As the Federal Circuit has explained, in patent cases, it is "particularly essential" for the district court to limit its gatekeeping function to "excluding testimony based on unreliable principles and methods" and to take care "not to overstep its gatekeeping role [by]... weigh[ing] facts, evaluat[ing] the correctness of conclusions, impos[ing] its own preferred methodology, or judg[ing] credibility, including the credibility of one expert over another." *Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1315 (Fed. Cir. 2014). "[W]here the methodology is reasonable and its data or evidence are sufficiently tied to the facts of the case, the gatekeeping role of the court is satisfied,

and the inquiry on the correctness of the methodology and of the results produced thereunder belongs to the factfinder." *Summit 6, LLC v. Samsung Elecs. Co.*, 802 F.3d 1283, 1296 (Fed. Cir. 2015). Where an expert meets the threshold established by Rule 702 and explained in *Daubert*, the court must allow the expert to testify and leave it to the jury to determine the weight to give to his testimony. *Daubert*, 509 U.S. at 596 ("[V]igorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking" an expert's testimony.)

V. ARGUMENT

A. Google Cannot Escape the Consequences of its Multi-Billion Dollar Use of the Invention By Relying on the EMVR or the SSPPU Doctrine.

Upon a finding that a patent is valid, enforceable, and infringed, the patent holder is entitled
to no less than a "reasonable royalty for the use made of the invention by the infringer." 35 U.S.C.
§ 284; Aqua Shields v. Inter Pool Cover Team, 774 F.3d 766, 770 (Fed. Cir. 2014) ("The 'value
of what was taken'—the value of the use of the patented technology—measures the royalty.").

1. <u>Mr. Green's Damages Model Is Tied to the Invention's Footprint in the Marketplace.</u>

"The hypothetical-negotiation approach to calculating reasonable-royalty damages 'attempts to ascertain the royalty upon which the parties would have agreed had they successfully negotiated an agreement just before infringement began." *Prism Technologies LLC v. Sprint Spectrum L.P.*, 849 F.3d 1360, 1376-77 (Fed. Cir. 2017). In *Prism*, the Federal Circuit explained that, although a plaintiff must tie its proof of damages to the invention's footprint in the marketplace, that requirement is satisfied where the plaintiff "adequately shows that the defendant's infringement allowed it to avoid taking a different, more costly course of action." *Id.* (internal citations omitted). As the Court further explained, "a hypothetical license may appropriately be based on consideration of the 'costs and availability of non-infringing alternatives' and the potential infringer's 'cost savings.'" *Id*; *see also Powell v. Home Depot*, *U.S.A., Inc.*, 663 F.3d 1221, 1240 (Fed. Cir. 2011) ("Reliance upon estimated cost savings from use of the infringing product is a well settled method of determining a reasonable royalty."); *Hanson v. Alpine Valley Ski Area, Inc.*, 718 F.2d 1075, 1080-1081 (Fed. Cir. 1983) (affirming reasonable royalty based on cost savings resulting from using patented snow-making technology).

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That is exactly how Mr. Green determines the royalty here.

Metaswitch Networks Ltd. v. Genband US LLC, C.A. No.: 14-cv-744, 2016 WL 87473
at *3 (E.D. Tex. Mar. 5, 2016) (rejecting challenge to plaintiff's expert's methodology of
attribut[ing] the value of the patent to the difference between the cost of practicing the patent and
the cost he calculated for transitioning to [the next best non-infringing] alternative."). 12
Google does not challenge Mr. Green's reliance on this cost savings methodology.

2. Mr. Green's Methodology Does Not Implicate the EMVR or the SSPPU Doctrine.

The EMVR and SSPPU doctrines serve two distinct purposes. First, they aim to avoid improperly compensating a patentee for unclaimed elements of an accused product, because, "[w]here small elements of multi-component products are accused of infringement, calculating a royalty on the entire product carries a considerable risk that the patentee will be improperly compensated for non-infringing components of that product." *See LaserDynamics, Inc. v. Quanta Computer, Inc.*, 694 F.3d 51, 67 (Fed. Cir. 2012) (*quoting Cornell Univ. v. Hewlett-Packard Co.*,

¹² As explained in Section III.B, *infra*, Mr. Green then further isolated the incremental benefit by apportioning out the non-accused components.

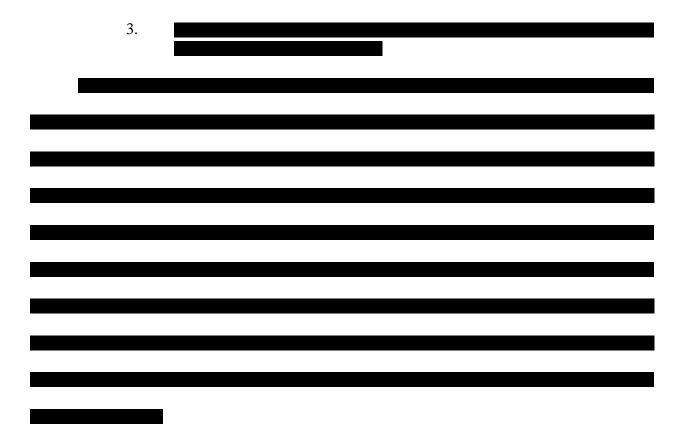
609 F.Supp.2d 279, 283, 287-88 (N.D.N.Y. 2009)). Second, the doctrines are intended to prevent a patentee from "skewing the damages horizon" by presenting the jury with evidence of a large royalty base that might make the patentee's demands seem a reasonable pittance by comparison. *See LaserDynamics*, 694 F.3d at 68 (*citing Uniloc USA, Inc. v. Microsoft Corp.*, 632 F.3d 1292, 1312 (Fed. Cir. 2012)).

Neither of these doctrines, nor the concerns they seek to address, are implicated by Mr. Green's methodology or the facts of this case. Unlike the cases on which Google relies, this case does not involve revenues generated by the sale of an end product. As explained above,

For that reason, the case law on which Google relies is inapt. For example, in *Microchip Technology Inc. v. Aptiv Services US LLC*, the plaintiff's expert attempted to apply the *Georgia-Pacific* factors, but his analysis largely focused on the value of the end product in which plaintiff's chip was incorporated – a media module manufactured and sold to automakers for incorporation into a car's infotainment system – rather than the cost savings the defendant achieved by using the infringing chip instead of the closest non-infringing alternative. *Microchip*, No. 1:17-CV-01194-JDW, 2020 WL 5203600, at *5 (D. Del. Sept. 1, 2020). The court concluded that by focusing on the total value of the end product and the total profit on the sale of each end product, without first connecting that value/profit to the claimed invention, the plaintiff's expert failed to reliably determine the profitability of the patented invention as opposed to the profitability of the end

product and excluded the expert's opinion regarding a reasonable royalty analysis based on the		
profitability of the end product. <i>Id.</i> at *5-6.		
In LaserDynamics, the plaintiff sued for infringement of its patent related to optical disk		
drives used in the defendants' laptop computers. Plaintiff's expert relied on the total revenues from		
sales of the defendant's laptop computers and simply applied a 2% running royalty on those		
revenues. LaserDynamics, 694 F.3d at 69-70. The court reversed the jury's award of a royalty on		
that basis, because the expert ignored comparable license agreements in the record that were not		
calculated as a percentage of any component or product and because the expert's methodology		
"fail[ed] to address the fundamental concern of the entire market value rule, [because] permitting		
[plaintiff] to use a laptop computer royalty base does not ensure that the royalty rate applied thereto		
does not overreach and encompass components not covered by the patent." <i>Id.</i> at 70.		
Unlike the royalty bases used by the experts in Microchip and LaserDynamics, Mr. Green's		
royalty base is not based on the entire value of a multi-component product, nor does he seek to		
skew the damages horizon by introducing evidence of revenue or profits unrelated to the footprint		
of the invention.		
Instead, as explained above, Mr. Green's reasonable royalty opinions are		
based on Google's own data and analyses and are tied to the facts of the case, which establish that		
the present value of incremental costs that Google avoided, as a direct result of its choice to deploy		

infringing



B. Mr. Green Properly Apportioned Between the Contributions of the Patented Technology and the Non-Infringing Components of the TPU System.

With respect to apportionment, Google first argues that "Mr. Green's use of an inflated royalty base infects his entire analysis and cannot be corrected through apportionment." Mot. at 13. For the reasons set forth above, Mr. Green's royalty base is reasonable because it is tied to the facts of the case. In addition, both of his apportionment methods are appropriately based on adjustments to the royalty rate, which is consistent with Federal Circuit precedent. *See Exmark Mfg. Co. v. Briggs & Stratton Power Prods. Grp., LLC*, 879 F.3d 1332, 1348 (Fed. Cir. 2018) ("We have held that apportionment can be addressed in a variety of ways, including 'by careful selection of the royalty base to reflect the value added by the patented feature [or] . . . by adjustment of the royalty rate so as to discount the value of a product's non-patented features; or by a combination thereof."). There is no basis to exclude either method.

Each of these ar	guments is without merit.
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C. Mr. Green	Does Not Allocate the Entire Cost Savings to Singular.
Google erroneou	usly asserts that Mr. Green concluded that a reasonable royalty "would be
ial to the amount th	at Google saved by virtue of the patented technology." Mot. at 17-18

Further, Mr. Green's reasonable royalty calculation does not include any of Google's incremental revenue due to the use of the patented feature. Ex. A, Green Rpt. at 109-113. Thus, Mr. Green's analysis clearly provides Google with a benefit even after accounting for the amounts owed to Singular under the cost savings framework.

D. The Jury Must Decide The Appropriate Royalty.

Ex. A, Green Rpt. at 105. Google argues that the royalty range is speculative and will mislead the jury. Mot. at 18-19. The Federal Circuit disagrees. As the Court has explained:

Because each case presents unique circumstances and facts, it is common for parties to choose different, reliable approaches in a single case and, when they do, the relative strengths and weaknesses of each approach may be exposed at trial or attacked during cross-examination. That one approach may better account for one aspect of a royalty estimation does not make other approaches inadmissible.

Summit 6, LLC v. Samsung Electronics Co., 802 F.3d 1283, 1296 (Fed. Cir. 2015) (in many cases "the record may support a range of reasonable royalties, rather than a single value."). Because the range of royalties proposed by Mr. Green is reasonable and tied to the facts of the case, it is for the jury, not the court, to consider which royalty best captures the incremental benefit of the patented technology. See e.g., Bayer Healthcare LLC v. Baxalta, Inc., 989 F.3d 964, 983 (Fed. Cir. 2021) (holding that district court "properly exercised its discretion in allowing [plaintiff] to ask the jury to select a rate between the range presented [by its damages expert].").

E. Testimony Regarding the Parties' Relationship Will Assist the Jury In Recreating the Hypothetical Negotiation.

Google's state of mind at the time of the hypothetical negotiation. Mot. at 19-20. Mr. Green does not intend to do either. As he explains in his discussion of *Georgia-Pacific* Factor 5, Mr. Green intends to discuss the parties' commercial relationship before and at the time of the hypothetical negotiation in March 2017. Ex. A, Green Rpt. at 91-92. Georgia Pacific Factor 5 is not limited to whether the parties would have been "competitors" or simply "inventor and promoter" as Google suggests. Mot. at 20. Those are simply examples provided by the court in *Georgia-Pacific*. *Georgia-Pacific v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970) (Factor 5: "[t]he commercial relationship between the licensor and licensee, such as, whether they are competitors in the same territory in the same line of business; or whether they are inventor and promoter.").

The facts of the cases on which Google relies in its Motion do not apply here because, unlike the parties in those cases, Singular does not intend to elicit testimony from Mr. Green regarding Google's intent or state of mind. *See e.g.*, *Holmes Grp.*, *Inc. v. RPS Prods.*, *Inc.*, No. 03-cv-40146-FDS, 2010 WL 7867756, *5 (D. Mass. June 25, 2010) (excluding defendant's expert's testimony concerning plaintiff's "intent to deceive" the patent office). It is appropriate for Mr. Green to discuss the parties' relationship at the time of the negotiation, including prior licensing negotiations, and he should be allowed to do so as it will assist the jury in recreating the hypothetical negotiation.

VI. CONCLUSION

For the foregoing reasons, Singular respectfully requests that the Court deny Google's Motion in its entirety.

REQUEST FOR ORAL ARGUMENT

Pursuant to Local Rule 7.1(d), Singular requests the Court to entertain oral argument on this motion, as Singular believes such will assist the Court in resolving the motion.

Dated: May 19, 2023 Respectfully submitted,

/s/ Adam R. Doherty

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CERTIFICATE OF SERVICE

I certify that all counsel of record who have consented to electronic service are being served with a copy of this document via email.

/s/ Adam R. Doherty